Attainment of Clean Water Act Goals

The Clean Water Act sets a national goal that, wherever attainable, water quality should provide for the protection and propagation of fish, shellfish and wildlife and provide for recreation in and on the nation's waters. These are often referred to as the fishable/swimmable goals of the Act. The data utilized to assess use support were evaluated in terms of the above goals. If warmwater aquatic habitat use was fully or partially supported, the fishable goal was assumed to be met. If a stream was not supporting the use, the fishable goal was not met. Similarly, if the primary contact recreation use was supported, then the swimmable goal was met. If the use was not supported, the goal was not met. Table 6 summarizes the attainment of the fishable/swimmable goals for Kentucky's rivers and streams. The fishable goal was met in more of the assessed waters than the swimmable goal. The swimmable goal was not met in about half of the assessed waters. As pointed out in the previous discussion, fecal coliform pollution is the major cause of this goal not being achieved. There is a difference in miles assessed for these goals because more biological data was available to assess the fishable goal than was bacteriological data to assess the swimmable goal.

Table 5

Relative Sources of Use Nonsupport in Rivers and Streams

Source Category	Miles Affected: Major Impact	Miles Affected: Moderate/Minor Impact
Point Sources		
Municipal	757.0	234.5
Industrial	234.2	11.2
CSO*	64.0	11.3
Storm sewers	27.2	
TOTAL	1,082.4	257.0
Nonpoint Sources		
Unspecified	614.2	208.4
Surface mining	600.3	156.5
Subsurface mining	249.5	78.9
Agriculture	173.8	253.1
Urban runoff	155.6	55.7
Petroleum activities	91.3	52.3
Habitat modification	86.3	68.3
Septic tanks	58.1	132.0
TOTAL	2,029.1	1,005.2
Unknown Sources	30.6	

*Combined sewer overflows

Table 6

Attainment of Clean Water Act Goals
in Rivers and Streams

Goal Attainment	Fishable Goal	Swimmable Goal
Miles meeting	7,840.7	1,307.6
Miles not meeting	792.4	1,097.8

Assessment of Pollution Caused by Toxics

The biomonitoring program focuses on the protection of aquatic life from toxic pollutants. However, one of the underlying themes of aquatic life protection is public health protection. During 1985, fish consumption advisories were issued for two streams because of the presence of PCBs in fish tissue in excess of the U.S. Food and Drug Administration (FDA) action level of 2.0 mg/kg. The advisories recommended that women of child-bearing age and pre-school children should not consume any fish from the streams, and that consumption by others should be infrequent. The streams involved were the Mud River in Logan, Butler and Muhlenberg counties and the West Fork of Drakes Creek in Simpson and Warren counties. In August 1986, the advisory on Mud River was upgraded to a warning that no one should consume fish. Information on these two streams is listed below.

List of Fishing Advisories and Bans

Stream: Mud River/Town Branch - Logan, Butler, Muhlenberg counties

Pollutant: PCBs

Type of Restriction: Warning - Signs are posted warning people not to eat fish from Mud River and Town Branch.

Area Affected: 64.7 miles

Date Established: Advisory, October 1985; Warning, August 1986

Source of Pollution: Unpermitted discharge from metal dye-cast plant

Comments: Cleanup in progress; monitoring continues, levels still elevated

Stream: West Fork Drakes Creek - Simpson, Warren counties

Pollutant: PCBs

Type of Restriction: Advisory - Consumption should be limited.

Area Affected: 46.8 miles

Date Established: April 1985

Source of Pollution: Spring draining an adhesive plant

Comments: Levels in fish appear to be declining, monitoring continues

The presence of PCBs in stream sediments and fish tissue may be an emerging problem in the state. Another toxic substance emerging as a public health concern is chlordane, which has been found in fish at levels exceeding the FDA action level at several locations throughout the state. (See following special studies discussion). Further study is needed to delineate the statewide extent of the problem.

The sediments of Mud River (Town Branch) and West Fork Drakes Creek are also contaminated by PCBs. The Mud River system is presently being studied by the University of Kentucky, under contract from the Division of Water, to determine the extent and magnitude of sediment contamination. Contamination in the West Fork Drakes Creek was limited to the area near the spring, approximately one mile.

Special Studies

The Division of Water has been involved in several studies which dealt with pollution from 307(a) priority pollutants. A summary of those studies follows.

Mississippi River/Lower Ohio River Early in 1987, the Kentucky Division of Water was notified by the State of Missouri Department of Conservation that a Fish Consumption Advisory had been issued for the Mississippi River, including the reach bordering Kentucky. The advisory was based on data showing chlordane levels exceeding FDA action levels in different species of fish taken from several locations. During a meeting among the Kentucky state agencies involved, i.e. Kentucky Department of Fish and Wildlife Resources (KDFWR), Cabinet for Human Resources (CHR) and Division of Water (DOW), it was decided that a study of fish contamination in the Mississippi and lower Ohio rivers would be undertaken. In late February, CHR collected samples of fish at several fish markets along the Mississippi River. These samples were analyzed by the CHR laboratory and split with the Department for Environmental Protection, Division of Environmental Services (DES) laboratory. The DOW coordinated a study with KDFWR to collect fish from three sites on the Mississippi and two sites on the lower Ohio. Fish were collected by KDFWR and transferred to DOW for processing and analysis. Sediment samples were also collected at all sites.

Fish samples from the Mississipi River were split with EPA Region IV and the State of Missouri. Fish samples from the lower Ohio River were split with EPA Region IV. Duplicate samples were also analyzed.

The chlordane values displayed a wide variation, with no distinct pattern related to location or type of fish, although channel catfish generally showed higher levels than others. According to DOW data, two out of nine samples had chlordane values above FDA action levels (one each from the Mississippi and Ohio rivers). The EPA Region IV split sample data indicated that only one out of ten samples were above the action level (an Ohio River sample). The results from Missouri on the split samples from the Mississippi River indicated that seven out of nine fillet samples were above the action level. Many of the values were either slightly above or below

the action level. The Ohio River (below Paducah) fish samples had somewhat elevated chlordane values, which is not unusual near a large urban area (DOW historical data). No PCB or DDT values were above the action levels for those contaminants. None of the sediment samples had detectable levels of chlordane or PCBs.

Levisa Fork/Fishtrap Reservoir The Kentucky Division of Water was notified by the Virginia Water Control Board (VWCB) in July 1987 of a potential water quality problem in the Levisa Fork. Fish samples collected by VWCB in July 1986 showed levels of PCBs above the FDA action level. They conducted a more intensive study to delineate the extent and source of the problem during July 1987.

To determine if a PCB contamination problem existed in the Kentucky portion of Levisa Fork, a screening study was conducted the first week of August 1987. Two stations were sampled for fish tissue and sediment analysis. One station was in Fishtrap Reservoir, the other in the Levisa Fork above the reservoir.

No fish fillet sample contained PCB levels above the FDA action level; therefore, no action has been taken at present. The DOW will continue to monitor this area to assess the extent of the contamination problem.

Mud River/Green River During the reporting period, the DOW continued to monitor the PCB contamination of fish tissue and sediment in the Mud River system and in the Green River. As was reported in the last 305(b) report, the Mud River system has been extensively contaminated by an unpermitted discharge of PCBs. The Mud River (64.7 miles) is still under a fish consumption warning because of the continuing high levels of PCBs present in fish and sediment. An extensive collection of fish for tissue analysis was conducted in the Green River during 1987. The DOW has contracted with the University of Kentucky to study the extent and magnitude of water and sediment contamination in the Town Branch, Mud River and Green River. However, results are not yet available.

Drakes Creek Fish and sediments from Drakes Creek were sampled during 1986. Although PCB levels appear to be declining, a fish consumption advisory remains in effect for 46.8 miles of the West Fork and mainstem of Drakes Creek.

EPA National Bioaccumulation Study During 1987, the Division of Water participated in the National Bioaccumulation study. Fish were collected from three stations (Big Sandy-Cattletsburg, Mud River-Russellville and Ohio River-West Point) within the state. Samples were transferred to EPA for analysis. Results have not yet been received from EPA.

304(l) Report

Section 304(l) of the 1987 amendments to the Clean Water Act requires states to focus attention on waters impaired by point source discharges of toxic (priority or Section 307(a)) pollutants. A preliminary list of affected waters and point source dischargers is required to be submitted as part of each state's 305(b) report by April 1, 1988. Data will continue to be collected and refined throughout 1988, and a final list with control strategies is to be submitted by February 1989. In addition to the list of waters affected by point source discharges of toxic pollutants, Section 304(l) also requires that all waters impaired by conventional and nonconventional pollutants, and nonpoint (or unknown) sources of toxic pollutants be listed. These three lists, with their 304(l) subdivisions, are quoted below. They are commonly referred to as the "mini list," "long list," and "short list," respectively.

(A)(i): A list of waters for which the state does not expect to achieve numeric water quality standards for Section 307(a) toxic pollutants after technology-based requirements have been met, due to either point or nonpoint sources of pollution. This list is a subset of the (A)(ii) list described below and could be a very short list where a state has few or no numeric criteria for Section 307(a) toxics, even if water quality impairments due to toxicity are occurring in many of the state's waterbodies.

(A)(ii): A comprehensive list of waters impaired by point or nonpoint source discharges of toxic, conventional, and nonconventional pollutants. This list should reflect all waters needing additional control actions, whether the problem is toxicity or some other impairment.

(B): A list of waters the state does not expect to achieve "applicable standards" after technology-based requirements have been met, due entirely or substantially to point source discharges of Section 307(a) toxics. EPA interprets "applicable standards" to mean both numeric criteria for Section 307(a) toxic pollutants and narrative "free from toxicity" standards.

Individual control strategies for point source discharges of toxic pollutants contributing to water quality problems are to be developed by February 4, 1989. The purpose of this effort is to meet applicable water quality standards by June 4, 1992. The primary means of attaining this goal will be through the Kentucky Pollutant Discharge Elimination System (KPDES) permitting process administered by the Kentucky Division of Water (DOW). Where permits are not reissued by February 1989, a draft or interim permit with a compliance schedule must be issued to meet the 1992 deadline. This will require the reopening of permits known to have toxic discharge problems even though they are not due for reissuance under the normal 5-year KPDES permitting cycle. Any problems with conventional and nonconventional pollutants in those dischargers identified to have toxics problems must also be addressed when the permit is reissued or reopened. Furthermore, EPA (under language of Section 303(b)(1)c)) requires that water quality-based permit limits be developed for waters that are not achieving water quality standards due to any pollutant causing toxic effects, not just the Section 307(a) toxic pollutants.

Methods To aid the states in their efforts to draw up the three lists, EPA outlined 16 categories of information on which data should be collected.

1. Waters where fishing or shellfish bans and/or advisories are currently in effect or are anticipated.

2. Waters where there have been repeated fish kills or where abnormalities (cancers, lesions, tumors, etc.) have been observed in fish and other aquatic life during the last ten years.

3. Waters where there are restrictions on water sports or recreational contact.

4. Waters identified by the states in the 1982, 1984, 1986 or draft 1988 State Section 305(b) reports as either "partially achieving" or "not achieving" designated uses.

5. Waters identified by the states and reported to EPA in the third quarter of FY 87 as waters needing water quality-based controls for "toxics" and "non-toxics."

6. Waters identified by the states as priority waterbodies in FY 86 because of impaired or threatened uses.

7. Waters where ambient data indicate the presence of Section 307(a) toxic pollutants from primary industries.

8. Waters for which effluent toxicity test results indicate possible violations of state water quality standards, including narrative "free from" criteria or EPA criteria where state standards are not available.

9. Waters with primary industrial major dischargers where simple dilution analyses indicate violations of state water quality standards (or EPA criteria where state standards are not available) for Section 307(a) toxic pollutants, ammonia, or chlorine. These dilution analyses could be based upon estimates of best available technology economically achievable (BAT) levels from effluent guidelines development documents, National Pollutant Discharge Elimination System (NPDES) permit application data (e.g., Form 2C), discharge monitoring reports (DMRs), or other available information.

10. Waters with municipal major dischargers requiring pretreatment where simple dilution analyses indicate violations of state water quality standards (or EPA criteria where state standards are not available) for Section 307(a) toxic pollutants, ammonia or chlorine. These dilution analyses could be based upon data from NPDES permit applications (e.g., Form 2A), DMRs, or other available information.

11. Waters with known or suspected use impairments where dilution analyses indicate violations of state water quality standards (or EPA criteria where state standards are not available) for Section 307(a) toxic pollutants, ammonia, or chlorine. This category includes waters with facilities not included in the previous two categories such as municipal majors not required to have pretreatment, federal majors, and minors having water quality impacts. These dilution analyses could be based upon estimates of BAT levels from effluent guidelines, development documents, NPDES permit application data, DMRs or other available information.

12. Waters classified for uses that will not support the "fishable/swimmable" goal of the Clean Water Act.

13. Waters where ambient toxicity or adverse water quality conditions have been reported by local, state, EPA or other federal agencies, the private sector, public interest groups, or universities. The organizations and groups should be actively solicited for research they may be conducting or reporting. For example, state university researchers, the USDA Extension Service, and the U.S. Fish and Wildlife Service are good sources of current field research and activities.

14. Waters identified as having impaired or threatened designated uses in the Clean Lakes Assessments conducted under Section 314 of the Clean Water Act.

15. Waters identified as impaired by nonpoint sources in the 1985 Association of State and Interstate Water Quality Pollution Control Administrator's report America's Clean Water: State's Nonpoint Source Assessment and waters identified as impaired or threatened in the nonpoint source assessments under Section 319 of the Clean Water Act.

16. Surface waters impaired by pollutants from hazardous waste sites on the National Priority List prepared under Section 105(8)(A) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA).

EPA subcontracted the work to be done under Categories 7, 9, 10 and 11. Information on the other categories was collected by the state and provided to the subcontractor for coding into a computer-based format acceptable to EPA.

Categories 1-3 are self-explanatory. Fish kill data were provided by the Department of Fish and Wildlife Resources and Kentucky's 1986 305(b) report.

Category 4 comprises the initial 1988 305(b) report determinations and also includes information that falls under Category 13. All segments that are reported as not fully meeting designated uses in the 305(b) report are included on the "long list." Ambient data on toxics was one of many factors that was evaluated in the 305(b) reporting process. If biological data indicated no impacts, then the segment was listed as supporting designated uses whether or not some ambient data showed violation of water quality standards. Therefore, segments with ambient violations of water quality standards may or may not appear on the "mini list."

Categories 5 and 6 were not used because Kentucky did not report: 1) waters needing water quality based controls (nearly all permits in Kentucky are written with water quality-based limits); or 2) priority watersheds.

Category 7 was performed by EPA personnel by means of STORET data and other computer data bases identifying industry locations and types. This information was useful in identifying potential point source discharges of toxics that may be contributing to elevated ambient levels. However, there were several problems with the methodology. First, industries were assigned assumed pollutant discharges based on their standard industrial classification code, industrial Category, and BAT technology. This approach is not appropriate in Kentucky, where most permits are water-quality based. Second, industries located on small streams with no assigned reach number were not included. This methodology omits many significant dischargers on small creeks. Third, many industries now discharge to municipal facilities, which were not included in the analysis. Therefore, the industries and their pollutants actually discharging into a particular reach may be significantly different than the generalized Category 7 information. The information from category 7 should also appear in discharge monitoring reports (DMRs) submitted by industries because the toxics that are analyzed from ambient station samples are also monitored in wastewater discharges.

Data for Category 8 were collected by reviewing : 1) biomonitoring tests performed since 1984 by the Division of Water on 36 municipal and 17 industrial discharges; 2) Permits Compliance System (PCS) violations for Section 307(a) toxic pollutants, chlorine, and ammonia; and 3) pretreatment program data submitted by POTWs with industries that contained data on 307(a) toxics and other pollutants. This latter data is not in a computer data base and necessitated the examination of semi-annual reports submitted by POTWs that contain influent and effluent data on many

toxic parameters. Only positive results from effluent-dominated streams (at 7Q10) were used as "other-toxics" data for the biomonitoring tests and ammonia or chlorine permit violations. Permit violations of Section 307(a) toxics resulted in segment listing where violations were of water quality-based limits. However, violations of technology-based limits on larger rivers did not necessarily result in instream problems because of available stream dilution. Technology-based limits should be met even where there is no discernable problem in the receiving stream. Although these dischargers exceeding technology-based limits may not appear on the "short list", they are targeted for enforcement action. KPDES permits were examined to identify discharges on water quality limited streams that have been issued technology-based limits. This was accomplished by means of a computer printout from PCS listing all permits with toxics and their permit limits.

The dilution analyses referenced in categories 9-11 were also performed primarily by a subcontractor, and methods will be detailed in their report (Research Triangle Institute, in print). Generally, the methods involved using computer data bases for: 1) lists of industries and municipalities; 2) industry averages for pollutant concentrations based on BAT; 3) stream locations and flows; and 4) pollutant standards. Again, as in Category 7, the generalized approach has several drawbacks. First and foremost, pollutant concentrations discharged are based on technology-based limits (BAT), while Kentucky issues water quality-based permits when appropriate. Thus, pollutant levels estimated in the streams will often be overestimated. Second, industries with no assigned industrial category or effluent guidelines, are not included in the analysis. Third, where an industry was located on a small stream not in the REACH system, flow from the nearest downstream segment in REACH was used. Thus, many industry discharges will be mixed with more stream flow than is actually there. Lastly, many industries on the list were no longer discharging, either because they have been inactivated or they now discharge to a municipality.

Stream segments that appear on the "short list" from the subcontractor dilution calculations were investigated in detail to determine the cause for listing and if the listing was reasonable. In many cases, a stream segment appears on the "short list" because of human health criteria. If that stream segment is not a source of domestic water supply, it was not included on the "short list" provided with this report. If a stream segment appeared on the "short list" because of stream flow estimates or discharge concentrations that are known to be unrealistic, then that segment was also not included in this report.

Category 12 is not applicable because Kentucky has no waters which are designated for uses below that necessary to maintain fishable/swimmable status.

Category 13 information was primarily included in the 305(b) report determination, and has been previously accounted for in Category 4. This data consisted largely of ecological studies conducted by DOW. Data collected included stream biota, sediments, fish tissue and water quality.

Category 14 was based on the DOW's ambient lakes monitoring program and previous Clean Lakes studies.

Further dilution calculations have been and will be made by DOW to determine is additive effects of dischargers are a problem, especially in areas where several facilities are in close proximity. The data used in these calculations usually comes from the permit limits.

Category 15 is included in the 305(b) report as the Section 319 nonpoint source reporting requirements. Stream segments affected by nonpoint sources are referenced to that portion of the 305(b) report. Because of the lack of hard data in this area, these segments would appear only on the "long list" in the final submittal of Section 304(l) requirements in February 1989.

Category 16 segments were identified by the Kentucky Division of Waste Management. Because Resource Conservation and Recovery Act (RCRA) and CERCLA sites have the potential to affect surface waters, they were included in this category. Only those surface waters known to be impaired by RCRA or CERCLA sites were included. There are many instances of known groundwater contamination not proven to be causing a surface water problem.

Results Results of the work are summarized in Tables 7, 8 and 9. The short list contains 23 stream segments with known or potential toxics problems from point sources. The mini list contains 45 stream segments which have toxics problems due to either point, nonpoint or unknown sources. The long lists contains 331 segments that are affected by toxic, conventional or nonconventional pollutants from any sources.

The 23 stream segments on the short list are affected by 15 industrial facilities, nine municipal sewage treatment plants (STPs or POTWs), and four RCRA or CERCLA waste sites (Table 7). Two of the waste sites, B.F. Goodrich in Calvert City and Mid-South Electric in Manchester, were listed because of problems from both permitted discharges and manifestation of groundwater contamination in surface waters. Several of the facilities on the short list are presently under enforcement action, and others will either cease to discharge or will discharge to a POTW.

The mini list (Table 8) comprises the segments on the short list and segments that contained toxics above water quality standards in ambient samples where the source(s) could not be determined, and use nonsupport was noted in the 305(b) report. Most of the segments falling into the latter category result from ambient metals levels at DOW primary water quality monitoring stations. Three segments (Cypress Creek in Calvert City, Mississippi River, and Nolin River) were listed because of chlordane or PCB levels in fish tissue. As was stated earlier in the methodology section, it should be realized that where other data (usually biological) indicated no use impairment, segments with some ambient data violations of water quality standards were not listed. There are numerous sites in the state where a few violations of metals criteria occurred that do not appear on the mini list. Ambient data are also scarce for the majority of the Section 307(a) organic pollutants.

The long list consists of 331 segments that are a compilation of all known water quality problems in the state (Table 9). Other than the segments listed because of their appearance on the "mini list," most of these segments are listed as a result of: 1) fecal coliform bacteria data from DOW primary stations or intensive bacteriological surveys; 2) ammonia, chlorine, or whole effluent toxicity from DMR and biomonitoring data; 3) siltation and acid drainage from coal mining activities; 4) salinity from oil and gas well operations; and 5) nutrient/organic enrichment from STPs and private sewer lines and septic fields. Those segments listed solely because of discharger information (i.e., permit violations, ammonia, chlorine or, whole effluent toxicity) were not included in the assessment of designated use support presented in Table 1.